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# Effects of a Presidential Candidate's Comments on HPV Vaccine

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## Abstract

**Background—**During and after the 2011 Republican presidential debate, a candidate questioned the safety of HPV vaccine. We sought to determine what effect these comments had on parents.

**Methods—**A national sample of 327 parents with adolescent sons ages 11–17 completed online surveys in fall 2010 (baseline, about a year before the debate) and 2011 (follow-up, about a month after the debate). We used regression models to examine the association of parents' awareness of the candidate's comments with HPV vaccine initiation among their sons, their willingness to get sons free HPV vaccine, and their beliefs about potential harms of HPV vaccine.

**Results—**Overall, 17% of parents reported hearing about the Republican presidential candidate's comments about HPV vaccine. Parents who were aware of the comments had a larger increase between baseline and follow-up in the belief that HPV vaccine might cause short-term health problems (mean change=0.47) compared to parents who were not aware (mean change=0.07, $p<0.001$). Awareness was not associated with HPV vaccine initiation among parents' adolescent sons, changes in parents' willingness to get their sons free HPV vaccine, or other outcomes (all $p>0.05$).

**Conclusions—**Although the candidate's comments may have increased some parents' beliefs about the short-term harms of HPV vaccine, the comments had no impact on other beliefs, willingness to vaccinate, or behavior. Having accurate information about HPV vaccine that is readily available to the public during such controversies may diminish their impact.

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**Keywords**

HPV; HPV vaccine; HPV vaccine controversy; presidential debate and HPV vaccine

## Introduction

Guidelines recommend human papillomavirus (HPV) vaccine for adolescents and young adults in the US to prevent cervical cancer and other HPV-related diseases (Markowitz et al., 2007; Centers for Disease Control, 2010; U.S. Food and Drug Administration, 2013). Despite recommendations, only 54% of adolescent females and 21% or less of adolescent males in the US have received at least one dose of the three-dose HPV vaccine regimen (i.e., vaccine initiation) (Reiter et al., 2011; Centers for Disease Control, 2012; Centers for Disease Control, 2013; Reiter et al., 2013). Data also suggest annual gains in HPV vaccine coverage among adolescent females are slowing (Moss et al., 2012), with only a 1% increase in vaccine initiation between 2011 and 2012. A 13% increase in vaccine initiation occurred among adolescent males during these same years (Centers for Disease Control, 2012; Centers for Disease Control, 2013). We sought to examine whether public discussion of vaccine concerns may be affecting beliefs and behaviors related to HPV vaccination.

Concerns about HPV vaccine have included potential short-term side effects such as pain at the injection site and fainting (Associated Press, 2008a; Associated Press, 2008b; Kotz, 2008). Some parents have also expressed concerns about long-term consequences following HPV vaccination, such as increased sexual activity (Schuler et al., 2011; Brewer & Fazekas, 2007; Stein, 2005) and that the vaccine may harm fertility (Katz et al., 2009). Research has not supported claims about lasting HPV vaccine side effects (Markowitz et al, 2007; Centers for Disease Control, 2010; Reiter et al., 2009; Slade et al., 2009; Forster et al., 2012). Data from the Vaccine Safety Datalink on adverse events following over 600,000 doses of HPV vaccine administered throughout the US showed no reliable increases in any of the adverse events examined (Gee et al., 2011). Furthermore, a recent report by the Institute of Medicine reported that no adverse events were “convincingly” linked to HPV vaccine; the reported probable mechanistic link between HPV vaccine and anaphylaxis was not supported by epidemiologic evidence (Institute of Medicine, 2011).

Despite unambiguous post-licensure data supporting HPV vaccine’s safety and consequent scientific consensus on the matter, public concern over potential side effects of the vaccine was heightened by a Republican presidential debate in September 2011. During this debate, Minnesota Representative Michele Bachmann criticized Texas Governor Rick Perry for issuing an executive order requiring that girls in Texas receive HPV vaccine before entering sixth grade. Perry stated that the order was “a mistake,” but that his decision was made in order to protect young women from cervical cancer (“Tea Party Republican debate”, 2011). Bachmann responded to Perry by stating that children “who have a negative reaction to this potentially dangerous drug… They don’t get a do-over” (“Tea Party Republican debate”, 2011). The day after the debate, Bachmann again commented on HPV vaccine during a televised interview. Bachmann said, “I had a mother last night come up to me here in

Tampa, Florida, after the debate. She told me that her little daughter took that vaccine, that injection, and she suffered from mental retardation thereafter" (Novograd, 2011).

The comments by Bachmann and Perry and the subsequent media coverage appeared to cause a marked increase in interest about HPV vaccine among US residents, as measured by Internet searches. Indeed, the second highest volume of searches on Google for "HPV vaccine" occurred in September 2011 (Figure 1) (Google Trends, 2013). The only time period with a higher volume occurred in February 2007, soon after the vaccine first became available for adolescent females in the US (Markowitz et al., 2007).

Such comments may also discourage parents from getting HPV vaccine for their children. The health belief model posits that people's engagement in health-related behaviors, such as vaccinating their children, depends on several theoretical constructs including perceived threat of disease and the perceived benefits and costs of taking action (e.g., vaccine efficacy and side effects) (Hochbaum, 1958). Parents who heard Bachmann's comments may have become more concerned about the potential dangers associated with vaccinating their children against HPV. According to the health belief model, this would increase parents' perceived barriers to HPV vaccination, which in turn would affect their HPV vaccination decisions. The health belief model also suggests that a "cue to action" must be present in order to trigger a health-related behavior. In this case, Bachmann's comments against HPV vaccine may have given parents considering vaccination pause – a "cue to inaction."

Given the large amount of attention received by the presidential candidate's comments, it is important to examine the potential effects of such comments. We analyzed data from a national survey to determine the effects of these comments on parents' beliefs about HPV vaccine and the vaccination behaviors of their adolescent sons. Although the candidate's comments on HPV vaccination focused on females, the comments could have had a meaningful impact among parents contemplating getting HPV vaccine for their adolescent sons, especially as vaccination among this population is rising quickly.

## Methods

### Participants

The HPV Immunization in Sons (HIS) Study examined US parents' attitudes and beliefs about HPV vaccination for their adolescent sons (Reiter et al., 2011; Reiter et al., 2013). Parents had sons ages 11–17 and belonged to an online national panel constructed by a survey company (Dennis, 2010). The company used a dual frame sampling approach (list-assisted, random-digit dialing supplemented by address-based sampling) to obtain a probability-based sample of US households for the panel. In households without Internet access, the survey company provides a laptop and free Internet access to panel members for completing multiple online surveys every month. Panel members with their own computers and Internet access receive points for completing surveys that can be redeemed for small monetary payments. Parents received these standard incentives for participating in the HIS Study. We asked parents with more than one son in the eligible age range to have the son with the most recent birthday be the index child for the study. The Institutional Review Board at the University of North Carolina approved the study.

The HIS Study was a longitudinal study, in which parents completed baseline surveys online in August and September 2010 (about a year prior to comments being made at the presidential debate) and follow-up surveys online in November 2011 (about a month after comments were made at the presidential debate). The survey company emailed 1,195 parents with an invitation to complete baseline surveys. Of the 752 parents who responded, 73% (*n*=547) were eligible and completed the baseline survey. For follow-up surveys, the company emailed invitations to 421 baseline participants who had remained part of the national panel. In total, 327 (78%) of these parents completed the follow-up survey. Parents provided consent prior to surveys, and the survey company sent three email reminders between baseline and follow-up to maximize participation at follow-up. We report data on the 327 parents who completed both baseline and follow-up surveys, as items concerning comments about HPV vaccination made during the presidential debate appeared on the follow-up survey.

## Measures

**Political Debate Variables—**Several items on the follow-up survey examined parents' familiarity with the comments made about HPV vaccine during the Republican presidential debate. The first item assessed awareness of these comments by asking parents, "Have you heard about comments on the HPV vaccine made at a recent presidential debate?" (yes or no). Parents who were aware received questions about their impressions of: 1) the candidate's (i.e., Michelle Bachmann's) comments about HPV vaccine; and 2) the media coverage that followed the debate. Response options for these two items included "mostly in favor of the vaccine", "mostly against the vaccine", and "neutral". A final item asked parents how they felt the candidate's comments had affected their opinions of HPV vaccine, with response options of "more in favor of the vaccine", "more against the vaccine", and "had no effect". These items assessed whether the comments or the ensuing media coverage may have served as cues to action or inaction) related to HPV vaccination.

**HPV Vaccination Outcomes—**Parents reported whether their adolescent sons had received any doses of HPV vaccine (*i.e.*, vaccine initiation). Among parents with unvaccinated sons, surveys assessed parents' willingness to get their sons free HPV vaccine using a 5-point response scale with responses ranging from "definitely not willing" to "definitely willing" (coded 1–5). Surveys assessed vaccination status and willingness to vaccinate at both baseline and follow-up.

Surveys assessed whether parents believed HPV vaccine might cause: 1) "short-term health problems, like fever or discomfort" (assessed at both baseline and follow-up); 2) "lasting health problems for guys" (assessed at both baseline and follow-up; we will use the term "boys" when referring to this survey item for the remainder of this report); and 3) "lasting health problems for girls" (assessed only at follow-up). We added the last item to the follow-up survey since comments made by Michelle Bachmann referenced a lasting health problem (*i.e.*, mental retardation) among girls. All belief items used a 5-point response scale with responses ranging from "strongly disagree" to "strongly agree" (coded 1–5). Baseline and follow-up items used the same wording and response scales. These items addressed the perceived barriers construct in the health belief model.

**Demographics—**The baseline survey assessed demographic characteristics (Table 1) at baseline for all participants. Parents described how important religion was to them using a 5-point response scale with responses ranging from “not at all important” to “extremely important” (coded 1–5). Parents described their views on most political matters using a 5-point response scale with responses ranging from “very conservative” to “very liberal” (coded 1–5). We defined “urban” as living in metropolitan statistical area (MSA) and “rural” as living outside an MSA. HIS Study surveys are available online at http://www.unc.edu/~ntbrewer/hpv.htm.

### Data Analysis

We examined whether awareness of the comments during the presidential debate was associated with: 1) HPV vaccine initiation among sons that occurred between baseline and follow-up surveys; 2) changes in parents’ willingness to get their sons free HPV vaccine (among parents whose sons remained unvaccinated throughout the entire study); 3) changes in beliefs that HPV vaccine might cause short-term health problems (among all parents); 4) changes in beliefs that HPV vaccine might cause lasting health problems for boys (among all parents); and 5) beliefs that HPV vaccine might cause lasting health problems for girls (among all parents). We used bivariate logistic regression to examine the association between awareness and HPV vaccine initiation. To examine changes in parents’ willingness to vaccinate and beliefs, we used a general linear model with survey time as a within-subjects factor (2 levels: baseline and follow-up) and awareness as a between-subjects factor (2 levels: aware and not aware). We used bivariate linear regression to examine the association between awareness and the belief that HPV vaccine might cause lasting health problems for girls. We then generated a general linear model to examine if beliefs at follow-up about lasting health problems differed by the gender specified in the survey items (within-subjects factor; 2 levels: boys and girls) and awareness (between-subjects factor; 2 levels: aware and not aware). Analyses used SPSS version 17.0 (SPSS Inc., Chicago IL), and all statistical tests were two-tailed with a critical alpha of 0.05.

## Results

### Sample Characteristics

The majority of parents were younger than age 45 (59%), non-Hispanic white (68%), married or living with a partner (80%), and had attended some college (60%) (Table 1). About 41% of parents described themselves as “very conservative” or “somewhat conservative,” and 16% described themselves as “very liberal” or “somewhat liberal.” The remaining parents held moderate political views (41%) or refused to answer the question about their political views (2%). About 32% of parents identified themselves as being born-again Christians. Parents lived in all four geographic regions of the United States, though largely in urban areas (84%). About 30% of parents had sons ages 11–12 at baseline, 37% had sons ages 13–15, and 33% had sons ages 16–17. Over half of parents (52%) also had a daughter between the ages of 9 and 26 (the approved age range for HPV vaccination).

### Awareness of Candidate's Comments

Overall, 17% (57/327) of parents reported hearing about the Republican presidential candidate's comments about HPV vaccine (Table 2). The majority of aware parents indicated that the candidate's comments were mostly against HPV vaccine (66%, 37/56), though 25% believed the comments mostly favored the vaccine. In contrast, a minority of aware parents reported that the media coverage following the debate was mostly against the vaccine (21%), while 48% reported the media coverage was mostly in favor of the vaccine. Most parents indicated that the candidate's comments had no effect on their opinions about HPV vaccine (68%). About 14% of aware parents reported that the candidate's comments made them more in favor of the vaccine, while about 18% said they were more against the vaccine as a result of the comments.

### Correlates of Awareness of Candidate's Comments

Among parents with unvaccinated sons at baseline ($n$=322), 6% (20/322) indicated their sons received HPV vaccine by follow-up. HPV vaccine initiation did not differ between sons whose parents were aware of the comments made about HPV vaccine during the presidential debate compared to those whose parents were not aware (2% vs. 6%; odds ratio=0.24, 95% confidence interval=0.03–1.80, $p$=0.16).

Among parents whose sons remained unvaccinated for the duration of the study ($n$=302), willingness to get their sons free HPV vaccine decreased from baseline to follow-up (mean=3.30, SD=1.19 vs. mean=3.00, SD=1.21; $p$=0.001). The decrease in willingness was similar between parents who were aware of the comments and those who were unaware ($F$=0.53, $p$=0.47 interaction; Figure 2, panel A).

Among all parents ($n$=327), the belief that HPV vaccine might cause short-term health problems increased over time, from a mean of 3.27 (SD=0.58) at baseline to a mean of 3.41 (SD=0.69) at follow-up ($p$<0.001). However, the increase differed between the two groups ($F$=12.83, $p$<0.001 interaction; Figure 2, panel B). Parents who were aware of the candidate's comments showed a larger increase in belief in short-term health problems (mean change = 0.47; baseline mean=3.28, SD=0.62; follow-up mean=3.75, SD=0.71, $p$<0.001) compared to parents who were unaware (mean change =0.07; baseline mean=3.27, SD=0.57; follow-up mean=3.34, SD=0.66; $p$=0.14).

Belief that HPV vaccine might cause lasting health problems for boys decreased over time among all parents (baseline mean=3.10, SD=0.61; follow-up mean=2.92, SD=0.70; $p$=0.001). However, change in this belief did not differ by awareness ($F$<1 interaction; Figure 2, panel C). Beliefs that the vaccine might cause lasting health problems for girls were similar between parents who were and were not aware of the candidates' comments (follow-up mean=3.04, SD=0.89; follow-up mean=2.94, SD=0.76; $p$=0.39). At follow-up, parents' beliefs about lasting health problems for boys and girls were similar, and these beliefs did not differ based on awareness of the candidate's comments (both $p$>0.05).

## Discussion

Ample evidence has established the efficacy and safety of HPV vaccine (Markowitz et al., 2007; Centers for Disease Control, 2010). However, comments made by public figures and subsequent media coverage could influence people's beliefs and behaviors surrounding the vaccine. The health belief model suggests several pathways in which these comments could influence behaviors. For example, negative comments about HPV vaccine could decrease its perceived benefits and thus undermine a key motivation for vaccinating. Furthermore, the comments themselves may serve as cues to inaction which actually dissuade parents from getting their children vaccinated. The increase in public interest in HPV vaccine following comments made at a 2011 Republican presidential debate and in later interviews demonstrates the relevance of such comments. Our study documents the limited effects of these comments on parents' beliefs about HPV vaccine and no effects on the vaccination coverage among their adolescent sons.

Fewer than one in five parents were aware of the candidate's comments, a number that is surprisingly low. In public health circles, many assume the comments garnered widespread attention yet the evidence suggests a relatively limited impact – that is, many parents did not hear the comments and remained uninfluenced by them. Furthermore, parents who had and had not heard about the comments had similar beliefs about the long-term harms of HPV vaccine, willingness to vaccinate their sons, and HPV vaccine initiation among their sons. It is especially encouraging that awareness of the comments was not associated with lower vaccine initiation, given that so few adolescent males in the US have received any doses of HPV vaccine (Reiter et al., 2011; Centers for Disease Control, 2012; Centers for Disease Control, 2013; Reiter et al., 2013). Bachmann's comments referred to HPV vaccine causing a lasting health problem (*i.e.*, mental retardation), so the lack of association between parents' awareness of the comments and change in beliefs about long-term harms is somewhat surprising.

A potential explanation for this finding is the positive media coverage that parents reported seeing after the debate. The Internet is one of the most common sources of information about HPV vaccine (Cates et al., 2010; Hughes et al., 2009; Tozzi et al., 2010), and data from Google confirm that online searches for HPV vaccine spiked after the debate (Figure 1). Though information of varying quality on HPV vaccine is available online (Habel et al., 2009), governmental agencies and academic institutions publish credible Web pages with high quality content about HPV vaccine (Tozzi et al., 2010). This online information may have increased parents' perceived benefits of vaccination, serving to counter any increase in perceived barriers resulting from Bachmann's comments.

Awareness of Bachmann's comments was, however, associated with a larger increase in the belief that HPV vaccine might cause short-term health problems. Although scientific studies suggest that short-term side effects are no more common with HPV vaccine than other vaccines (Institute of Medicine, 2011), previous media attention and anecdotal accounts have focused on short-term side effects like pain and fainting (Kotz, 2008; Moyer, 2011). Previous studies indicate that though the majority of media stories are neutral toward HPV vaccine (Habel et al., 2009; Madden et al., 2011), many stories lack important details on

vaccine safety and side effects (Kelly et al., 2009; Quintero et al., 2011). The change in beliefs about the vaccine's short-term harms may therefore be attributable to anecdotal accounts, early media stories about the vaccine's short-term side effects (*e.g.*, pain and fainting), and the media's ongoing failure to provide more complete information about the vaccine's safety. An alternative is that the candidate's comments about long-term harms registered for parents aware of them, but learning more about the vaccine's safety in the media coverage and online caused parents to discount or "downgrade" the severity of the potential harms. It is also possible that controversial comments more easily change parents' beliefs about short-term than long-term harms as the former may better fit with parents' own experiences of minor vaccine-associated harms like soreness. Given that comments like those made by the candidate may affect some parent beliefs, it is important that accurate information on HPV vaccine is available through a variety of channels (*e.g.*, healthcare providers, the Internet, and other media sources).

Our study's strengths included a national sample of parents and a longitudinal study design. Data collection for the follow-up survey closely followed the debate and subsequent media coverage. The HIS Study examined HPV vaccination among adolescent males, so we did not focus on adolescent females and their parents. Thus, the baseline survey did not include an item on parents' beliefs about HPV vaccine and lasting health problems for girls, which would most closely reflect the content of Bachmann's comments. However, beliefs about long-term harms in males and females were similar and did not differ between parents who had and had not heard about the candidate's comments. Finally, HPV vaccine uptake was based on parents' reports of vaccination, leaving the possibility of recall errors. HPV vaccination status is accurately recalled by most parents, giving us greater confidence in this outcome (Dorell et al., 2011).

Despite these limitations, we believe this novel study has important implications. Our longitudinal survey offered an opportunity to explore the impact of Michele Bachmann's erroneous comments on the side effects of HPV vaccine. Though comments by public figures on HPV vaccine receive a great deal of attention in the media, it appears they have relatively little effect on parents' beliefs and behaviors. The duration of those effects remains a topic for further study. Nevertheless, it is important to ensure that accurate information on HPV vaccine is available to parents in order to minimize the impact of such comments.

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## References

Associated Press. Cervical cancer vaccine called most painful shot. Fox News. Jan 4. 2008 Retrieved from http://www.foxnews.com/story/0,2933,320132,00.html

Associated Press. Some girls fainting after receiving HPV vaccine. MSNBC. 2008 Jan 3. Retrieved from http://www.msnbc.msn.com/id/22492557/

Brewer NT, Fazekas KI. Predictors of HPV vaccine acceptability: A theory-informed, systematic review. Preventive Medicine. 2007; 45(2–3):107–114.10.1016/j.ypmed.2007.05.013 [PubMed: 17628649]

Cates JR, Shafer A, Carpentier FD, Reiter PL, Brewer NT, McRee A, Smith JS. How parents hear about human papillomavirus vaccine: Implications for uptake. Journal of Adolescent Health. 2010; 47(3):305–308.10.1016/j.jadohealth.2010.04.003 [PubMed: 20708571]

Centers for Disease Control and Prevention. FDA licensure of quadrivalent human papillomavirus vaccine (HPV4, Gardasil) for use in males and guidance from the Advisory Committee on Immunization Practices (ACIP). Morbidity and Mortality Weekly Report (MMWR). 2010; 59(20): 630–632. [PubMed: 20508594]

Centers for Disease Control and Prevention. National and state vaccination coverage among adolescents aged 13–17 years - United States, 2011. Morbidity and Mortality Weekly Report (MMWR). 2012; 61:671–677. [PubMed: 22932301]

Centers for Disease Control and Prevention. National and state vaccination coverage among adolescents aged 13–17 years - United States, 2012. Morbidity and Mortality Weekly Report (MMWR). 2013; 62(34):685–693. [PubMed: 23985496]

Dennis, JM. Knowledge panel design summary; 2010. 2012. Retrieved February 13, 2013, from http://www.knowledgenetworks.com/knpanel/docs/knowledgePanel(R)-design-summary-description.pdf

Dorell C, Jain N, Yankey D. Validity of parent-reported vaccination status for adolescents aged 13–17 years: National immunization survey-teen, 2008. Public Health Rep. 2011; 126(Suppl 2):60–69. [PubMed: 21812170]

Forster AS, Marlow LAV, Stephenson J, Wardle J, Waller J. Human papillomavirus vaccination and sexual behaviour: Cross-sectional and longitudinal surveys conducted in England. Vaccine. 2012; 30(33):4939–4944.10.1016/j.vaccine.2012.05.053 [PubMed: 22664223]

Gee J, Naleway A, Shui I, Baggs J, Yin R, Li R, et al. Monitoring the safety of quadrivalent human papillomavirus vaccine: Findings from the Vaccine Safety Datalink. Vaccine. 2011; 29(46):8279–8284.10.1016/j.vaccine.2011.08.106 [PubMed: 21907257]

Google Trends. Web search interest: HPV vaccine, United States, 2004-present. 2013. Retrieved Apr 4, 2013, from http://www.google.com/trends/explore#q=hpv%20vaccine&geo=US&cmpt=q

Habel MA, Liddon N, Stryker JE. The HPV vaccine: A content analysis of online news stories. Journal of Women's Health (2002). 2009; 18(3):401–407.10.1089/jwh.2008.0920

Hochbaum, GM. Public participation in medical screening programs: a socio-psychological study. US Department of Health, Education, and Welfare, Public Health Service, Bureau of State Services, Division of Special Health Services, Tuberculosis Program; 1958.

Hughes J, Cates JR, Liddon N, Smith JS, Gottlieb SL, Brewer NT. Disparities in how parents are learning about the human papillomavirus vaccine. Cancer Epidemiology Biomarkers & Prevention. 2009; 18(2):363–372.10.1158/1055-9965.EPI-08-0418

Institute of Medicine. Adverse effects of vaccines: Evidence and causality. Washington, D.C: The National Academies; 2011.

Katz ML, Reiter PL, Heaner S, Ruffin MT, Post DM, Paskett ED. Acceptance of the HPV vaccine among women, parents, community leaders, and healthcare providers in Ohio Appalachia. Vaccine. 2009; 27(30):3945–3952.10.1016/j.vaccine.2009.04.040 [PubMed: 19389447]

Kelly BJ, Leader AE, Mittermaier DJ, Hornik RC, Cappella JN. The HPV vaccine and the media: How has the topic been covered and what are the effects on knowledge about the virus and cervical cancer? Patient Education and Counseling. 2009; 77(2):308–313.10.1016/j.pec.2009.03.018 [PubMed: 19395221]

Kotz, D. 5 things to consider before getting the HPV vaccine. US News and World Report. 2008 Sep 2. Retrieved from http://health.usnews.com/articles/health/cancer/2008/09/02/5-things-to-consider-beforegetting-the-hpv-vaccine.html

Madden K, Nan X, Briones R, Waks L. Sorting through search results: A content analysis of HPV vaccine information online. Vaccine. 2012; 30(25):3741–3746.10.1016/j.vaccine.2011.10.025 [PubMed: 22019758]

Markowitz LE, Dunne EF, Saraiya M, et al. Quadrivalent human papillomavirus vaccine: Recommendations of the Advisory Committee on Immunization Practices (ACIP). Morbidity and Mortality Weekly Report (MMWR). 2007; 56(RR-2):1–24. [PubMed: 17218934]

Moss JL, Gilkey MB, Reiter PL, Brewer NT. Trends in HPV vaccine initiation among adolescent females in North Carolina, 2008–2010. Cancer Epidemiology Biomarkers & Prevention. 2012; 21(11):1913–1922.10.1158/1055-9965.EPI-12-0509

Moyer C. Bachmann HPV vaccine comment might spark new patient fears. American Medical News. 2011

Novograd, J. Bachmann continues to seize on HPV. 2011. Retrieved Dec 30, 2012, from http://firstread.nbcnews.com/_news/2011/09/13/7743549-bachmann-continues-to-seize-on-hpv?lite

Quintero Johnson J, Sionean C, Scott AM. Exploring the presentation of news information about the HPV vaccine: A content analysis of a representative sample of U.S. newspaper articles. Health Communication. 2011; 26(6):491–501.10.1080/10410236.2011.556080 [PubMed: 21469005]

Reiter PL, McRee AL, Pepper JK, Gilkey MB, Galbraith KV, Brewer NT. Longitudinal predictors of human papillomavirus vaccination among a national sample of adolescent males. American Journal of Public Health. 2013; 103(8):1419–1427.10.2105/AJPH.2012.301189 [PubMed: 23763402]

Reiter PL, Brewer NT, Gottlieb SL, McRee A, Smith JS. How much will it hurt? HPV vaccine side effects and influence on completion of the three-dose regimen. Vaccine. 2009; 27(49):6840–6844.10.1016/j.vaccine.2009.09.016 [PubMed: 19765398]

Reiter PL, McRee A, Kadis JA, Brewer NT. HPV vaccine and adolescent males. Vaccine. 2011; 29(34):5595–5602.10.1016/j.vaccine.2011.06.020 [PubMed: 21704104]

Schuler CL, Reiter PL, Smith JS, Brewer NT. Human papillomavirus vaccine and behavioural disinhibition. Sexually Transmitted Infections. 2011; 87(4):349–353.10.1136/sti.2010.048017 [PubMed: 21357601]

Slade BA, Leidel L, Vellozzi C, et al. Postlicensure safety surveillance for quadrivalent human papillomavirus recombinant vaccine. JAMA. 2009; 302(7):750–757.10.1001/jama.2009.1201 [PubMed: 19690307]

Stein, R. Cervical cancer vaccine gets injected with a social issue: Some fear a shot for teens could encourage sex. Washington Post. 2005 Oct 31. Retrieved from http://www.washingtonpost.com/wp-dyn/content/article/2005/10/30/AR2005103000747.html

Tea Party Republican Debate. CNN Transcripts; Sep 12. 2011

Tozzi AE, Buonuomo PS, Ciofi degli Atti ML, Carloni E, Meloni M, Gamba F. Comparison of quality of internet pages on human papillomavirus immunization in Italian and in English. Journal of Adolescent Health. 2010; 46(1):83–89.10.1016/j.jadohealth.2009.05.006 [PubMed: 20123262]

U.S. Food and Drug Administration. Complete list of vaccines licensed for immunization and distribution in the US. Jan 17. 2013 Retrieved February 13, 2013, from http://www.fda.gov/BiologicsBloodVaccines/Vaccines/ApprovedProducts/ucm093833.htm

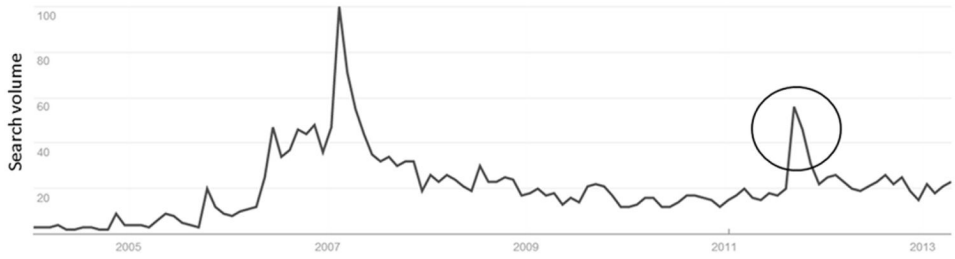
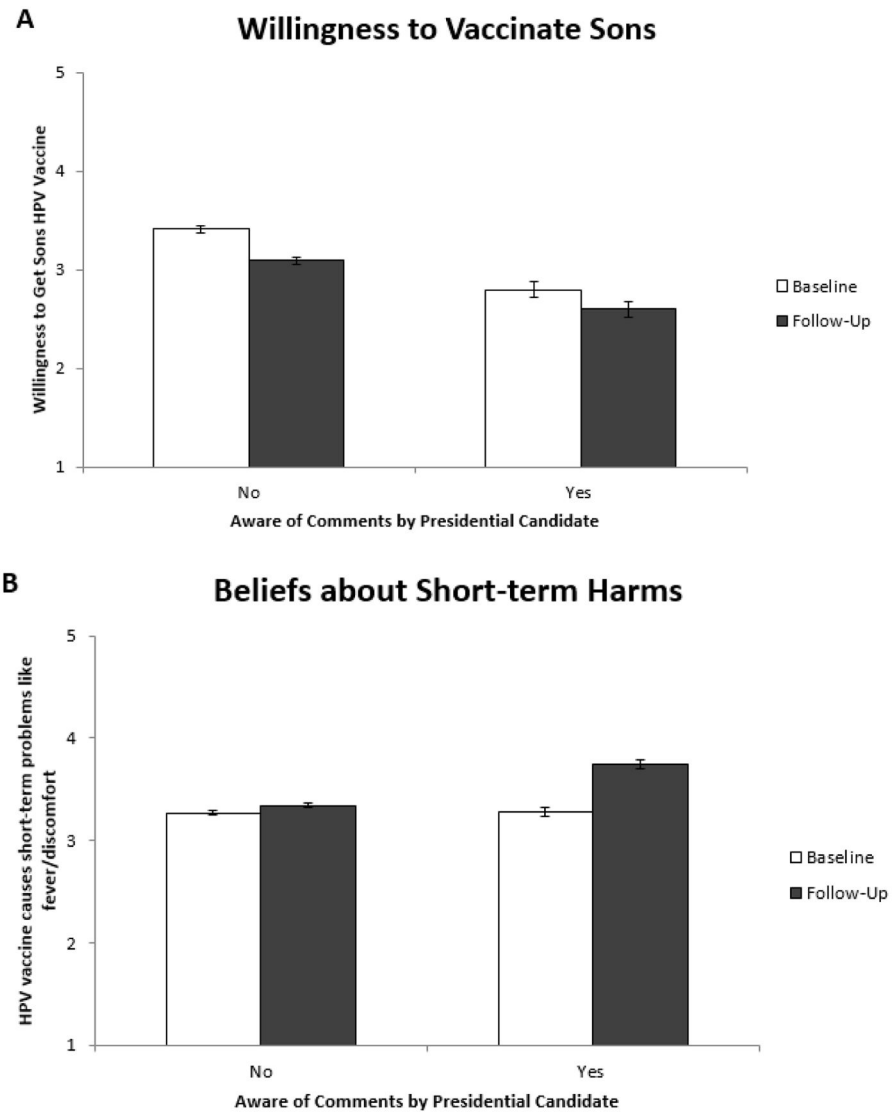



**Figure 1.**

Internet searches for “HPV vaccine” in the United States. Circle highlights September 2011, when a Republican presidential candidate made public comments about HPV vaccine. Data from Google Trends; 100 represents peak search volume.



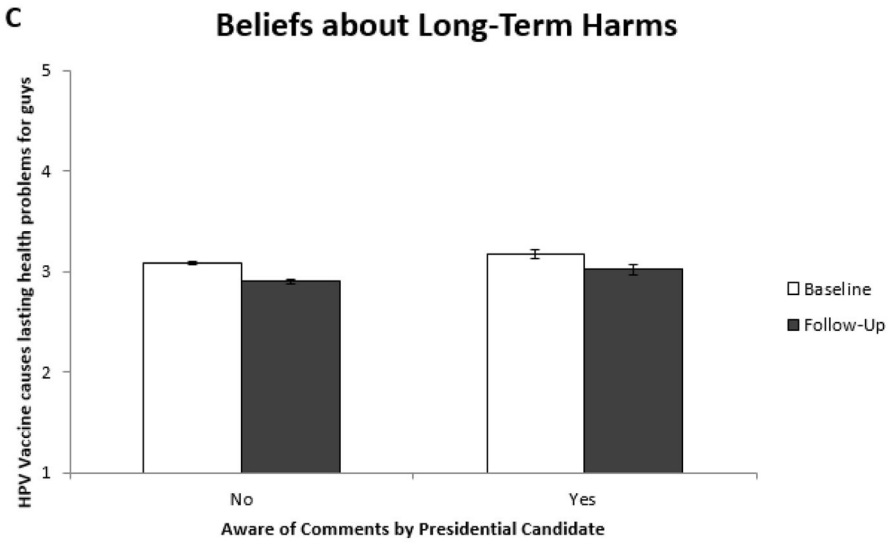



**Figure 2.**
Changes in HPV vaccine willingness and beliefs over time. Error bars present standard errors.

**Table 1**

Characteristics of parents and their adolescent sons (*n*=327)

| | ***n* (%)** |
|---|---|
| **Parent Characteristics** | |
| Gender | |
| Female | 170 (52) |
| Male | 157 (48) |
| Age (Years) | |
| <45 | 192 (59) |
| 45+ | 135 (41) |
| Race / Ethnicity | |
| White, Non-Hispanic | 221 (68) |
| African American, Non-Hispanic | 33 (10) |
| Hispanic | 59 (18) |
| Other, Non-Hispanic | 14 (4) |
| Marital Status | |
| Divorced, Widowed, Separated, Never Married | 66 (20) |
| Married or Living with Partner | 261 (80) |
| Had Daughter Ages 9–26 | |
| No | 156 (48) |
| Yes | 171 (52) |
| Education Level | |
| High School Degree or Less | 131 (40) |
| Some College or More | 196 (60) |
| Born-Again Christian | |
| No | 223 (68) |
| Yes | 104 (32) |
| Importance of Religion [a], mean (SD) | 3.56 (1.36) |
| Political Affiliation [b], mean (SD) | 2.63 (1.00) |
| **Son Characteristics** | |
| Age (Years) | |
| 11–12 | 99 (30) |
| 13–15 | 120 (37) |
| 16–17 | 108 (33) |
| **Household Characteristics** | |
| Household Income | |
| <$60,000 | 151 (46) |
| ≥$60,000 | 176 (54) |
| Urbanicity | |
| Rural | 51 (16) |
| Urban | 276 (84) |
| Region of Residence | |

| | ***n*** **(%)** |
|---|---|
| Northeast | 65 (20) |
| Midwest | 86 (26) |
| South | 114 (35) |
| West | 62 (19) |

*Note.* SD = standard deviation.

[a] 5-point response scale ranging from “not at all important” to “very important” (coded 1–5).

[b] 5-point response scale ranging from “very conservative” to “very liberal” (coded 1–5).

**Table 2**

Parents' beliefs about the presidential candidate's comments about HPV vaccine

| | ***n*** **(%)** |
|---|---|
| Heard Candidate's Comments about HPV Vaccine | |
| Yes | 57/327 (17) |
| No | 270/327 (83) |
| Candidate's Comments about HPV Vaccine[a] | |
| Mostly in Favor | 14/56 (25) |
| Mostly Against | 37/56 (66) |
| Neutral | 5/56 (9) |
| Media Coverage about Vaccine Following Debate[a] | |
| Mostly in Favor | 27/56 (48) |
| Mostly Against | 12/56 (21) |
| Neutral | 17/56 (31) |
| Effect of Candidate's Comments on Opinions about HPV Vaccine[a] | |
| More in Favor | 8/56 (14) |
| More Against | 10/56 (18) |
| Had No Effect | 38/56 (68) |

[a]Assessed among 56 parents who were aware of the candidate's comments about HPV vaccine. One aware parent did not answer subsequent questions regarding these comments.